

# Evaluation of Post Fire Restoration Treatments to Reduce Invasive Plant Species

**Sara J. Scoles, Todd C. Esque, Lesley A.  
DeFalco, Sara E. Eckert, Dustin F. Haines**

**USGS, Las Vegas Field Station**

# **A Collaborative Effort**

**The BLM and other management agencies expend many resources on fire restoration efforts.**

**BLM gave USGS approximately 2% of the budget for this restoration project on the Arizona Strip.**

**Money to design, implement and interpret an experiment to determine the costs and benefits of common management actions.**

**Results are directly relevant to the situation in the field.**





# Restoration Questions

- 1) Which treatment combination produces the greatest increase in plant production and species richness after fire in a Pinyon-Juniper community?
- 2) Do treatments increase or decrease cheatgrass and/or red brome and other alien plants?



# Unburned Reference Sites



**Juniper**  
**Big sagebrush**  
**Cliffrose**  
**Mormon tea**  
**Blackbrush**  
**Wild buckwheat**  
**Prickly pear**





# Burned Only

- Jump Canyon area of Mohave county, Arizona now within Parashant National Monument
- Lightning-ignited fire in May 1999
- 17,000 acres burned





# Burned and Seeded

**Commercial seed mixture (4,242,000 seeds/acre)**

**Sand dropseed (62%)**

**Western wheatgrass (3%)**

**Crested wheatgrass (9%)**

**Russian wild-rye (4%)**

**Yellow sweet clover (3%)**

**Indian ricegrass (3%)**

**Sideoats grama (9%)**

**Pubescent wheatgrass (5%)**

**Small burnet (1%)**





# Burned, Seeded and Harrowed



# Plant Responses

- **Perennial Plant Cover by Species**
- **Perennial Plant Density by Species**
- **Perennial Species Richness**



- **Annual Plant Production by Species**
- **Annual Species Richness**



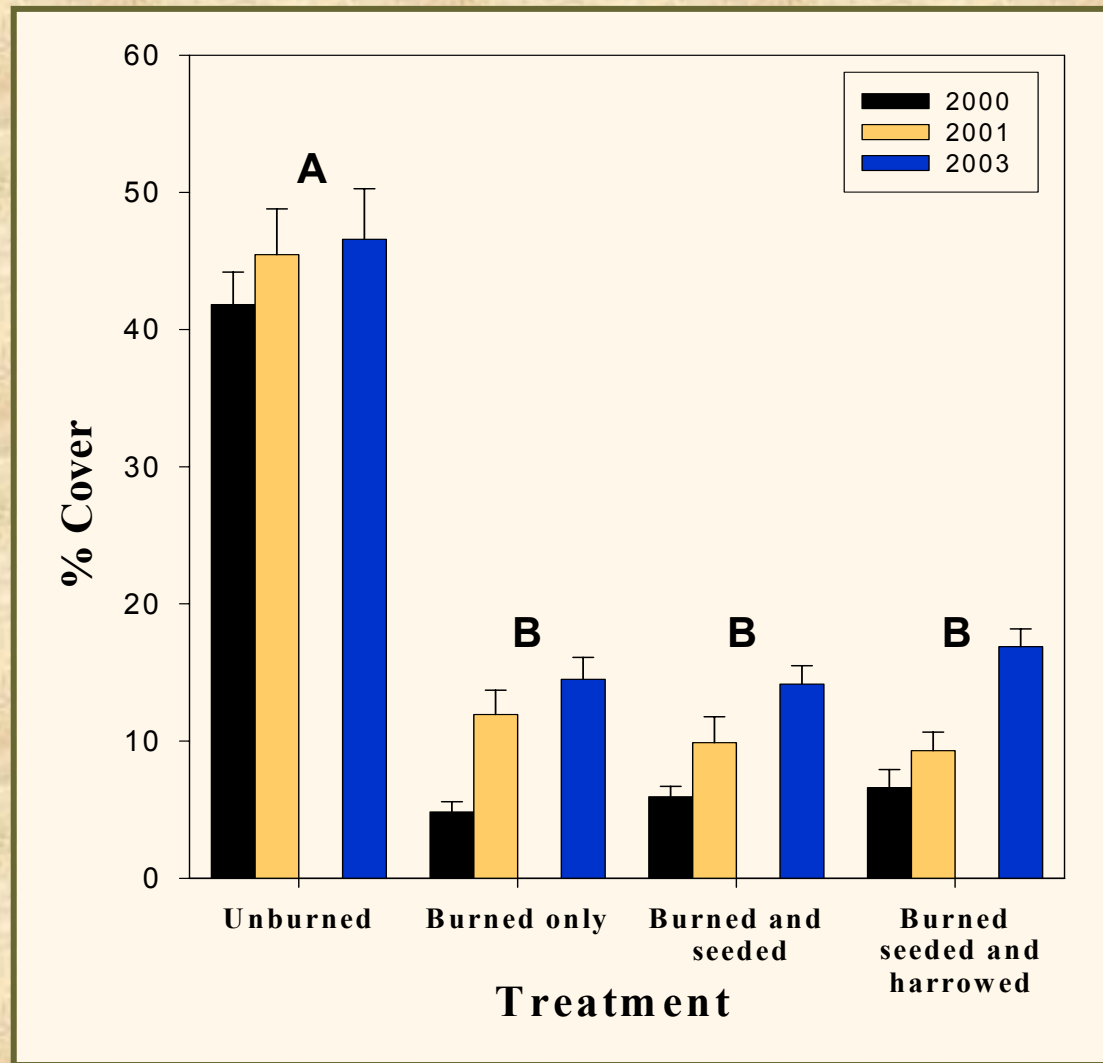
# Perennial Plant Response

- Dominant perennials in burned plots are disturbance-tolerant species such as desert tobacco, globemallow and snakeweed.
- Seeded species have successfully established in all seeded plots.
- Harrowing neither increased nor decreased establishment for any seeded species.
- Plant density equal on all burned treatments, regardless of seeding or harrowing.





# Perennial Plant Cover





# Annual Plant Response

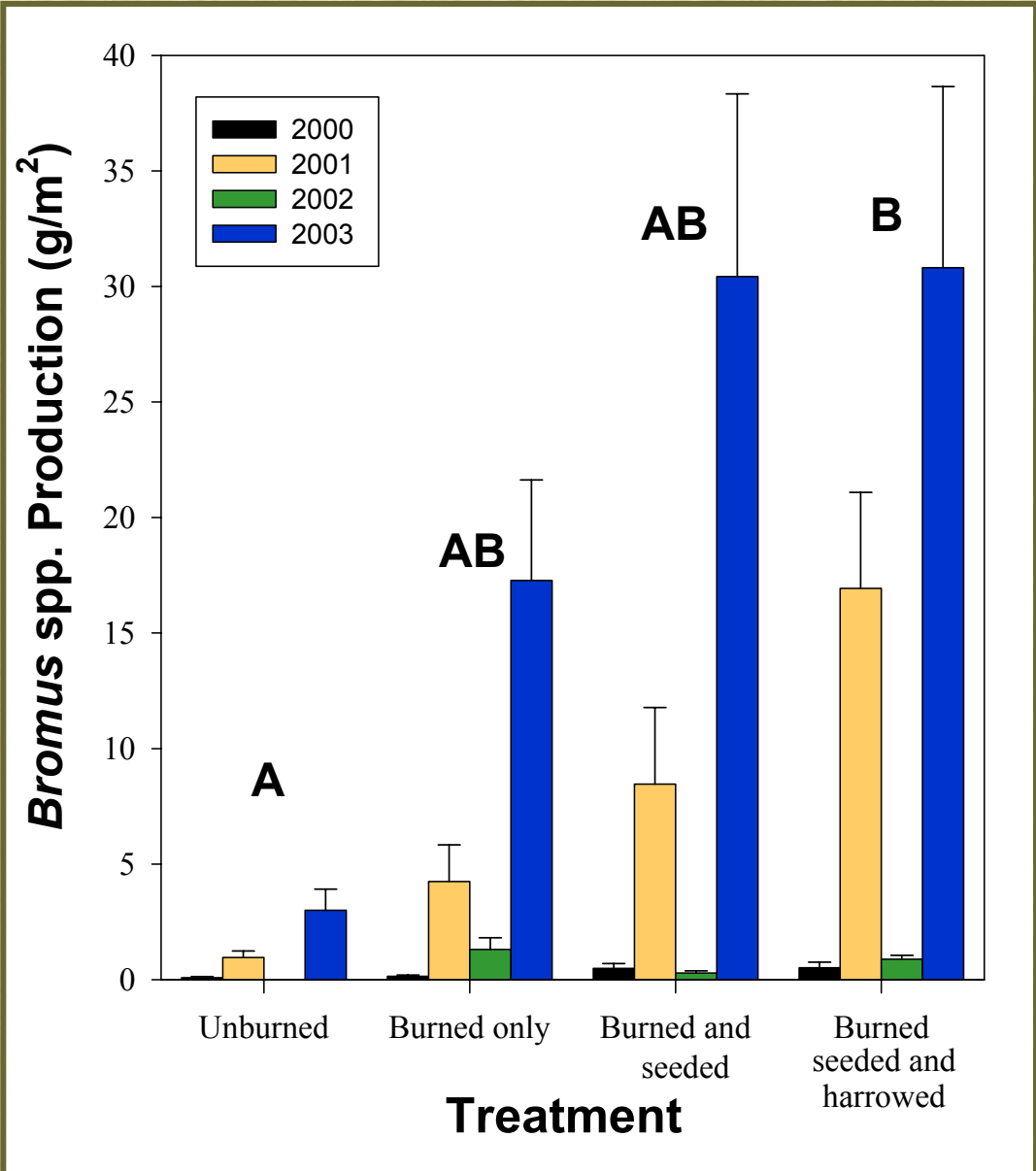
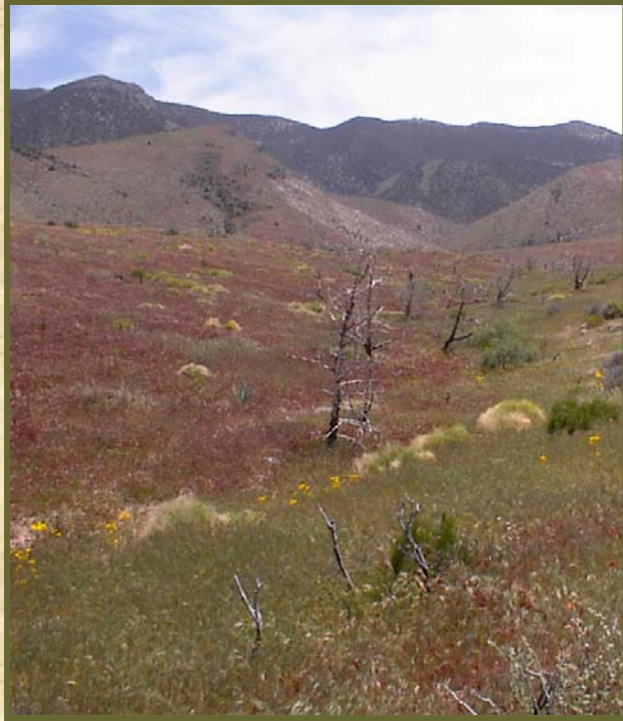
- Annual plant production is consistently higher in burned areas than in unburned areas.
- Annual species richness is also higher in burned areas during low rainfall years.
- Seeding and seeding or harrowing did not change annuals as a group.



However...



# *Bromus* species Production



# Implications

**Seeding did not increase perennial cover or density compared to burned plots without treatment, but did change the species composition.**

**Seeding must be considered in light of restoration goals.**

**Plant cover and density**

**Establishment of selected species**



# Implications

**Harrowing did not improve establishment of any seeded species beyond seeding alone, and resulted in increased red brome and cheatgrass.**

**Harrowing has not proven beneficial in this restoration effort**

# Thanks to...

**BLM, Arizona Strip District employees, for  
implementing treatments**

**Ken Beckstrom, BLM, for project administration**

**L.D. Walker, BLM, for ATV transportation**

**Roger Taylor, BLM, for encouraging the development  
and continuation of this project**

**Kelly Goward, for helping set up plots and supervise  
interns**

**Student Conservation Association Interns, for many  
hours of data collection and entry**